

REMARKS

Reconsideration of this application, based on this amendment and these following remarks, is respectfully requested.

Claims 1 through 14 are now in this case. Claims 6 through 8 and 11 are amended. Claims 13 and 14 are added.

Claim 1 was rejected under §102 as anticipated by the Dent reference.<sup>1</sup> The Examiner asserted that the radio disclosed by the reference relative to its Figure 3 anticipates the claim, considering its duplexer 301, its transmitter section 300, and its receiver section including a first down conversion section 302. The Examiner asserted that this first down conversion section 302 includes first and second mixers 309 that receive a first local oscillator signal having a frequency equal to the center frequency of the transmitter section, if the frequency  $F_{txoff}$  disclosed by the reference<sup>2</sup> is set to zero.<sup>3</sup>

Applicant respectfully traverses the rejection, on the grounds that it is based on a misinterpretation of the Dent reference, and that the teachings of the Dent reference in fact fall short of the requirements of the claim.

It is axiomatic, in the patent law, that a proper anticipation rejection requires that each limitation of the claim be found in a single reference.<sup>4</sup> This standard is not met when one compares the elements of claim 1 with the teachings of the Dent reference.

Applicant traverses the anticipation rejection on the grounds that the Dent reference does not disclose first and second mixers in a first down conversion section of a receiver section of a radio, where the first and second mixers receive a first local oscillator signal having a frequency equal to the center frequency of the transmitter section or a sub-harmonic thereof.

<sup>1</sup> U.S. Patent No. 5,983,077, issued November 9, 1999 to Dent.

<sup>2</sup> Dent, *supra*, column 11, lines 18 through 20.

<sup>3</sup> Office Action of December 1, 2003, page 2.

<sup>4</sup> See, e.g., *In re Donohue*, 766 F.2d 531, 534, 226 USPQ 619, 621 (Fed. Cir. 1985).

The Examiner states that mixer 309 of the reference corresponds to the first and second mixers of the claim. However, mixer 309 of the Dent reference is a single mixer, and therefore cannot correspond to "first and second mixers" of the claim, which clearly refer to (at least) two mixers, even if one accepts that it receives the transmit frequency<sup>5</sup>.

Applicant notes that a second mixer in downconverter 302 of the Dent reference is shown in its Figure 3; this second mixer is the element presenting a signal to element 303(a). However, this second mixer does not receive a local oscillator signal having a frequency equal to the center frequency of the transmitter section or a sub-harmonic thereof, as required by the claim. Rather, the local oscillator 307 that provides its local oscillator signal to this second mixer is "tuned to different channels by control processor 200 sending programming information to main synthesizer 308, according to the channel allocated for communications".<sup>6</sup> This second, unlabeled, mixer in the Dent reference therefore cannot correspond to either of the first and second mixers of claim 1.

Applicant also wishes to address the point raised by the Examiner, regarding the first local oscillator (LO) signal having a frequency equal to that of the center frequency of the transmitter section in the case where  $F_{txoff}=0$ .<sup>7</sup> In this case, the transmitter and receive center frequencies ( $F_{tx}$  and  $F_{rx}$ , respectively) are the same. However, the frequency  $F_{lo}$  at the output of oscillator 307 need not equal the transmit frequency  $F_{tx}$  even in this case<sup>8</sup>; accordingly, even accepting the Examiner's premise, the claim is still not met by the Dent reference. However, the Dent reference nowhere discloses that its radio should function in this  $F_{txoff}=0$  condition. Indeed, Applicant submits that the Dent radio is not intended to function in this condition, and in fact would not function in this condition. If one accepts the Examiner's assertion that the  $F_{txoff}=0$  state corresponds to the claim, in which the local oscillator frequency at the receiver is equal to the center frequency of the transmitter section, there would be no periodic signal issued by its downconverter 309, rendering the downstream frequency divider 311 and phase

<sup>5</sup> Dent, *supra*, column 11, lines 20 through 22.

<sup>6</sup> Dent, *supra*, column 10, lines 56 through 59.

<sup>7</sup> See Office Action, *supra*, page 2, ¶2.

<sup>8</sup> Dent, *supra*, column 11, line 10, equation (5).

comparator 312 inoperable.<sup>9</sup> Further, the DUPLEX SPACING frequency defined in the Dent reference would necessarily be negative (for any non-zero value of intermediate frequency IF1), which is a nonsensical result.<sup>10</sup> For this reason, Applicant submits that the §102 rejection of claim 1 is in error, as based on a misinterpretation of the teachings of the Dent reference.

For these reasons, Applicant respectfully submits that the Dent reference does not anticipate claim 1. In short, the reference does not disclose, either expressly or under any valid interpretation, first and second mixers receiving a first local oscillator (LO) signal having a frequency equal to the center frequency of the transmitter section or a sub-harmonic thereof, as required by claim 1.

Applicant further respectfully submits that there is no suggestion from the prior art or otherwise to modify the teachings of the Dent reference in such a manner as to reach claim 1.

As mentioned above, claim 1 is directed to a radio having a receiver section that includes a first down conversion section comprising first and second mixers, said first and second mixers receiving a first local oscillator (LO) signal having a frequency equal to the center frequency of the transmitter section or a sub-harmonic thereof. This construction provides the important advantage that the largest interferer for the radio, namely its own transmit side, can be effectively removed, and image rejection efficiently achieved.<sup>11</sup> Other advantages include the reduction in linearity and DC offset constraints in downstream receiver circuitry, and also the elimination of the need to generate a separate high frequency local oscillator signal for the receiver.<sup>12</sup>

As mentioned above, the Dent reference fails to disclose the use of the transmit frequency, or a sub-harmonic thereof, as a local oscillator frequency for mixers in its receiver section. As mentioned above, the local oscillator 307 generating the signal applied to the mixer in the receive circuit of the reference is "tuned to different channels by control processor 200

<sup>9</sup> Dent, *supra*, column 11, lines 20 through 40.

<sup>10</sup> Dent, *supra*, column 11, lines 16 through 18.

<sup>11</sup> Specification of S.N. 09,785,759, at page 5, lines 9 through 13.

<sup>12</sup> Specification, *supra*, page 5, lines 13 through 16.

sending programming information to main synthesizer 308, according to the channel allocated for communications".<sup>13</sup> The other references of record in this case add no teachings in this regard, and as such the combined teachings of the references fall short of the requirements of the claims. Further, nowhere does the Dent reference itself, nor do any of the other references, indicate that it would be useful to tune the local oscillator of the Dent radio to the transmit frequency, nor do any of these references provide any motivation to do so. Accordingly, there is no suggestion to modify the teachings of the applied references in such a manner as to reach claim 1.

Especially considering that the important advantages provided by the radio of claim 1 stem directly from the differences between the claim and the Dent reference, Applicant submits that claim 1 and its dependent claims are not only novel, but are patentably distinct over the Dent reference. Reconsideration of the rejection of claim 1 is therefore respectfully requested.

Claim 2 was rejected under §103 as unpatentable over the Dent reference in view of the Borras et al. reference.<sup>14</sup> The Dent reference was applied as discussed above relative to claim 1, and Borras et al. teachings regarding that the radio is an FDD radio were combined with the Dent reference to reach the claim. Claims 3 and 5 were rejected under §103 as unpatentable over the Dent and Borras et al. references, further in view of the Minami reference<sup>15</sup>, because of the teachings of the Minami reference regarding high pass filtering of downconverted signals. Claims 4, 6, and 7 were rejected under §103 as unpatentable over the Dent, Borras et al., and Minami references, further in view of the Watkinson reference<sup>16</sup> teachings regarding sets of two mixers downstream from the high pass filters.

Claim 6 is amended above for clarity, specifically by separately reciting the sets of two mixers as first and second sets of two mixers coupled to the output of the first and second high pass filters, respectively. Claim 7 is amended for clarity, and for consistency with claim 6 upon

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<sup>13</sup> Dent, *supra*, column 10, lines 56 through 59.

<sup>14</sup> U.S. Patent No. 5,465,409, issued November 7, 1995 to Borras et al.

<sup>15</sup> EP 0 508 401 A2, published October 14, 1992, in the name of NEC Corporation.

<sup>16</sup> U.S. Patent No. 6,271,737, issued August 7, 2001 to Watkinson.

which it depends. No new matter is presented by this amendment to claims 6 and 7.<sup>17</sup> Further, Applicant submits that the amendment to claims 6 and 7 is not presented for any reason relating to patentability of either claim, and does not narrow the scope of either claim from its original scope.<sup>18</sup>

Applicant traverses the §103 rejection of dependent claims 2 through 7, on the grounds that the rejection is in error. The §103 rejection is based on the application of the Dent reference against claim 1. For the reasons set forth above, the Dent reference fails to disclose first and second mixers receiving a first local oscillator (LO) signal having a frequency equal to the center frequency of the transmitter section or a sub-harmonic thereof, as required by claim 1. The other applied references fail to add teachings in this regard. Accordingly, Applicant submits that the §103 rejection is necessarily in error, because the erroneous interpretation and application of the Dent reference against the claims also serves as the basis for this rejection.

Also as discussed above, Applicant submits that claim 1 and its dependent claims 2 through 7 are patentably distinct over the prior art of record in this case, because the teachings of the references fall short of the requirements of the claims, and because there is no suggestion to modify these teachings to reach the claims.

Applicant further respectfully submits that claims 3 through 7 are further patentably distinct over the prior art. While the Minami reference may disclose the use of high pass filters, Applicant submits that there is no motivation to combine these high pass filters into the radio of the Dent reference, considering that there is no teaching or suggestion to downconvert the received signal using the transmit frequency, as results in the claimed radio. Rather, the absence of high pass filters in the Dent reference indicates that the low frequencies may be desired in its receiver processing. Accordingly, Applicants submit that claims 3 through 7 are further patentably distinct over the prior art of record in this case.

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<sup>17</sup> See Figure 1 of application S.N. 09,785,759, *supra*.

<sup>18</sup> See *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., Ltd.*, 535 U.S. 722, 62 USPQ2d 1705 (2002), *on remand*, 304 F.3d 1289, 64 USPQ2d 1698 (Fed. Cir. 2002).

New claim 13, dependent on claim 2, is added to more completely cover all aspects of Applicant's invention. New claim 13 further recites, relative to claim 2, that the received signal has a center frequency different from that of the transmitter, and also further requires first and second high pass filters, each for passing frequencies including an intermediate frequency corresponding to a difference between the center frequency of the receiver section and the center frequency at which the transmitter section transmits. No new matter is presented by this new claim, considering the support for the limitations of claim 13 in the specification.<sup>19</sup>

For the same reasons as discussed above relative to claim 1, and to claims 3 through 7, Applicant submits that new claim 13 is also novel and patentably distinct over the prior art of record in this case.

Claims 8 and 12 were rejected under §103 as unpatentable over the Dent reference in view of the Borras et al. reference, as discussed above relative to claim 2. Claims 9 and 11 were rejected under §103 as unpatentable over the Dent and Borras et al. references, further in view of the Minami reference, as discussed above relative to claims 3 and 5. Claim 10 was rejected under §103 as unpatentable over the Dent, Borras et al., and Minami references, further in view of the Watkinson reference, as discussed above relative to claims 4, 6, and 7.

Claim 8 is amended for clarity, specifically by correcting the reference to the frequency division duplexed radio, consistent with the definition of this acronym in the art and the specification<sup>20</sup>. Claim 11 is amended to correct an error of a typographical nature. No new matter is presented by this amendment to claims 8 and 11. Further, this amendment is not presented for any reason relating to patentability of claims 8 and 11, and does not narrow the scope of these claims from their original scope.<sup>21</sup>

For similar reasons as discussed above relative to claim 1 and its dependent claims, Applicant traverses the §103 rejection of claim 8 and its dependent claims, and submits that these claims are also patentably distinct over the prior art of record in this case.

<sup>19</sup> See specification, *supra*, page 5, lines 1 through 8.

<sup>20</sup> Specification, *supra*, page 2, line 8.

<sup>21</sup> *Festo, supra*.

Claim 8 requires the step of providing a local oscillator (LO) signal to a first down conversion section of an FDD radio receiver, where the LO signal has a frequency equal to the center frequency of the transmit signal or a sub-harmonic thereof. The claim further requires the step of filtering the output of the first down conversion section of the receiver. The method of claim 8 provides the same important advantages as discussed above relative to claim 1, including the elimination of interference from the most significant interferer in the radio, namely its own transmitter.

As discussed above, the Dent reference fails to disclose the providing of a local oscillator (LO) signal to the down conversion section of its receiver, the LO signal having a frequency equal to the center frequency of the transmit signal or a sub-harmonic thereof. To the extent that the Dent reference teaches use of the transmit frequency in the receiver, the transmit frequency is instead applied to a downconverter 309 that mixes this transmit frequency with the local oscillator frequency that is actually used by the receive mixer, to generate a signal corresponding to the transmit offset frequency  $F_{toff}$ .<sup>22</sup> Further, the local oscillator frequency that is used by the Dent radio in its receive downconverter mixer is "tuned to different channels by control processor 200 sending programming information to main synthesizer 308, according to the channel allocated for communications".<sup>23</sup> The other references of record add no teachings in this regard. Accordingly, Applicant submits that the combined teachings of the references fall short of the requirements of claim 8, and therefore also fall short of the requirements of its dependent claims 9 through 12.

Also as discussed above, the allegation by the Examiner that the Dent reference can teach the providing a local oscillator (LO) signal to a first down conversion section of an FDD radio receiver, where the LO signal has a frequency equal to the center frequency of the transmit signal or a sub-harmonic thereof, in the case where frequency  $F_{toff}$  is zero, is in error. Not only does the reference fail to disclose operation in this state, nor does such a state necessarily reach the requirements of the claim, but indeed the teachings of the reference itself indicate that the circuitry would be inoperable or nonsensical in this alleged state. For this

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<sup>22</sup> Dent, *supra*, column 11, lines 16 through 41.

reason, Applicant further respectfully submits that the rejection of claims 8 through 12 is in error.

Applicant further submits that there is no suggestion to modify the teachings of the Dent references, or the other references, in such a manner as to reach the requirements of claims 8 through 12. None of the references provide any motivation to use a local oscillator frequency, at the transmit frequency or a sub-harmonic thereof, in the down conversion of the received signal. Especially considering that the advantages of the invention directly result from the differences between the claims and the prior art, Applicant respectfully submits that claims 8 through 12 are patentably distinct over the prior art of record in this case.

Claim 14 is added to more completely cover all aspects of Applicant's invention. New claim 14 is directed to a method of operating a receiver in an FDD radio to remove interference caused by a transmitter that transmits at a transmit center frequency, by mixing the receive signal with a local oscillator frequency equal to the transmit center frequency or a sub-harmonic thereof, to provide a down-converted receive signal. The claimed method high-pass filters the down-converted receive signal, and the filtered signal is converted to a base-band signal.

Applicant submits that the specification clearly supports new claim 14,<sup>23</sup> and as such no new matter is presented by this new claim.

For the same reasons as discussed above relative to claims 1 and 8, and their dependent claims, Applicant respectfully submits that new claim 14 is novel and patentably distinct over the prior art of record. Nowhere does the Dent reference, nor any of the other references of record, disclose the mixing of a receive signal, with a local oscillator frequency to provide a down-converted receive signal, the local oscillator frequency equal to the transmit center frequency or a sub-harmonic thereof, where the transmit and receive center frequencies are different from one another, as required by claim 14. Further, as discussed above, there is no suggestion or motivation to modify these teachings of the prior art in such a manner as to

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<sup>23</sup> Dent, *supra*, column 10, lines 56 through 59.

<sup>24</sup> Specification, *supra*, page 4, line 1 through page 5, line 8; Figure 1.

provide such a mixing step as recited in this claim, especially considering the important advantages provided by the claimed invention, such advantages stemming directly from the differences between the prior art and the claim.

Favorable consideration of new claim 14 is therefore respectfully requested.

For the above reasons, Applicant respectfully submits that all claims now in this case are in condition for allowance. Reconsideration of the above-referenced application is therefore respectfully requested.

Respectfully submitted,



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